IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Walter Musial, et al.	)	Group Art: 2857
		)	
Serial No. :	10/520,011	)	Examiner: GUTIERREZ, Anthony
		)	
Filed:	December 29, 2004	)	Atty. Dkt. No. NREL 01-51
		)	
Title:	Resonance Test System	)	

DECLARATION UNDER 37 C.F.R. §1.131

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I declare:

1. This declaration is being made in support of allowance of claims 1-21 in the above-identified patent application (the "invention").

2. I am the lead inventor and a co-inventor of each claim of the invention that this declaration is being made in support of.

3. Each of the acts described herein was undertaken in the United States.

4. I, along with my co-inventor, conceived of the invention and at least reduced the invention to practice via modeling prior to June 6, 2001. See Exhibit A, which is a record of invention and related reports prepared in the normal course of business to describe the invention. The record of invention is signed by each of the inventors. The laboratory notebook is signed by each inventor and witnessed. See also, Exhibit B, which contains email correspondence showing continued work on the project up through and including assignment of the record of invention to outside patent counsel for preparing and filing a patent application. The redacted dates are all prior to June 6, 2001. Other redactions are for other unrelated inventions.

8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

[redacted]

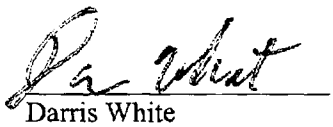
Dated this 31 day of January 2009.

Darris White

Dated this ___ day of January 2009.

8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

_____ Dated this ___ day of January 2009.
Walter Musial


Darris White

Dated this 29 day of January 2009.

EXHIBIT A

NO B+R #

U.S. DEPARTMENT OF ENERGY
OFFICE OF ASSISTANT GENERAL COUNSEL FOR PATENTS
RECORD OF INVENTION

NREL IR No: 01-51

This Record of Invention is an important legal document and proper care in its early and complete preparation will save important time and inconvenience in the future. The instructions* on the back should be read carefully before filling in the data.

A. Inventor: 1. Name(s): Walter Musial, Darris White — 2. Title or Position: Senior Engineer II, Summer Intern

3. Employed by: National Wind Technology Center — 4. Permanent Address: 194 Meadowlock Way, Boulder, CO 80304; 1475 Folsom St Apt 1005, Boulder, CO 80302

B. Title of Invention(1*): Resonance Test System for Wind Turbine Blades Using Hydraulic Excitation

C. Description of Invention (2*):

1. This invention uses hydraulic actuators to excite the fundamental flap frequency of wind turbine blades. The actuator accelerates a given mass harmonically to generate the input force for the test. The magnitude of the input force is controlled by the actuator stroke. Additional masses are added to the test blade to provide the desired stress profile and mode shape. This test method has several advantages over the method previously used. The energy required to test the blade has been significantly reduced and the system requires less hydraulic flow. The duration of the test depends primarily on the fundamental frequency of the loaded blade not the oil flow capacity. This will generally require less test time than the conventional test for blades requiring large displacements (i.e. blades greater than 30 meters in length). Another advantage to this test method is that more of the blade can be tested. The shape of the stress profile for the Resonance Test System produces some stress near the tip of the blade that can not be accurately produced using the previous test method.

2. Edge loading will be applied in conjunction with the resonant flap excitation using constant amplitude forced displacement loading at a single spanwise point. The edge force will be delivered at the same cycle frequency as the resonant flap actuator system described in part 1 above. This system overcomes the major shortcoming of previous resonance blade testing by allowing the edge load to be applied simultaneously with the flap test. This also allows a net decrease in the total test time because the edge test does not have to be done separately.

D. Dates and Places of Inventions:

1. Conception by inventor (3*): [redacted] At NWTC, Golden, CO

2. First Sketch or Drawing: [redacted] At NWTC, Golden, CO In Workbook None Page

3. First Written Description: [redacted] At NWTC, Golden, CO In Workbook None Page

4. Disclosure to Others (4*): At

a. [signature] 7/11/2001 At NWTC (Scott Hughes)

b. [signature] 7/10/01 2001 At NWTC (Sandy Butterfield)

5. Completion of Model or Full Size Device: June 27, 2001 At: NWTC, Golden, CO

6. First Test or Operation of Invention: At

E. Results of Tests and Extent of Use of Invention (5*):
Models indicate that the Resonant Test System will reduce the peak hydraulic flow rate from 370 GPM to 147 GPM and could reduce testing time from 70 days to 45 days for 34m long blade.

F. Names of all persons having knowledge of facts stated under D and E:
Walter Musial, Darris White, Scott Hughes, Sandy Butterfield, Bob Thresher

G. Pertinent Reports (6*):

H. Other Closely Related Publications, Patents, and Patent Applications (7*):

I. Rights of U.S. Government:

J. Licenses or Assignments:

K. Contracts Involved:
Contract No.: Date:
Subtask No.: 5030-2000 Date: [redacted]
Contractor and Address:
Type of Contract:
(Unclassified) | Restricted | Confidential | Secret

L. Signature of Witness: Cynthia Bypdlik — Date: 7-11-01

Signature of Inventor(s): [signature] Date: 7/11/01
[signature] 7/11/01

Witnessed by (8*): Date:

(OVER) Rev. 11/8/93

Received
SEP 05 2001

Darris White
Research Assignment

Project Subtask: 5000-2000
Project Leader: Walt Musial
[redacted]

Design and Analysis of a Resonance Testing System for Wind Turbine Blades Using a Servo-Hydraulic Excitation.

Background:

The structural testing facilities at the National Renewable Energy Laboratory are the only ones in the U.S. where full scale testing of large MW class wind turbine blades can be conducted. The laboratory facilities, located at the National Wind Technology Center (NWTC), have been in operation since 1989 and are internationally recognized and accredited by A2LA. The capabilities include static testing and fatigue testing. Static tests are designed to test the blades ability to withstand extreme load conditions under a single load application, while fatigue tests are designed to validate the operational lifetime of the blade under repeated damage-equivalent loading. The structural test facilities use a state-of-the-art servo-hydraulic system that applies the flap and edge loading to the blade at a single span of the blade. The loads are computed to deliver a full life of operation in a fraction of the design life by accelerating the fatigue damage caused by a single cycle two or more orders of magnitude. Typical tests run 1 to 5 million cycles. The amount of oil that can be pumped through the actuators and the number of cycles in the test determine the speed at which a test can be run. As blade size has increased, the demand for larger actuators with higher loads and longer strokes have in turn led to larger oil pump requirements in order to complete tests in a reasonable time frame. Such escalation is in progress at the NWTC where the current pump capacity is being upgraded from 150 GPM to 280 GPM.

In Denmark, other blade testing methods have been used that appear to have merit for some applications. Almost exclusively, the Danes have employed resonance testing as their primary means for testing blades. In resonance testing, the blade is excited at its natural frequency and the amplitudes and strain levels are controlled for blade fatigue tests of any size. In Denmark, the excitation method has been limited to using an eccentric mass (200-500 Kg) rotating on a shaft with a variable speed drive (30 - 90 rpm) to control the amplitude of vibration. This method is simple but it works. The Danes have been using this technique for over 15 years and have worked out most of their control problems.

The advantages of resonance testing are:

1. The blade typically can be cycled faster,
2. The blade can be excised over its entire span,
3. The energy required to conduct a test much lower,
4. The lab space required to conduct a test is much less, and
5. It appears the cost of the equipment (especially for large blades) is lower.

The disadvantages of resonance testing are:

1. The loads cannot be applied accurately because biaxial load combinations are not possible and,
2. The load distribution is not known explicitly and must be inferred from analysis or static testing.

Although the advantages outweigh the disadvantages, the accuracy of testing with hydraulic actuators is still the preferred method. Both types of testing are allowed under IEC 61400-23 and it seems that both may have merit in their own right.

At NREL, the testing of large blades is limited to a single test bay, which is sometimes occupied for up to six months with a single blade test. The demand for testing has continued to grow and faster and more efficient testing methods may be necessary to meet the demand over the next few years. Therefore, we would like to investigate a lower cost, higher speed test method such as resonance testing.

Overall Research Objective

Design, develop, and build a resonance testing system that can be used in the 4th quarter of 2001 to test large wind turbine blades at the NWTC using existing servo-hydraulic equipment.

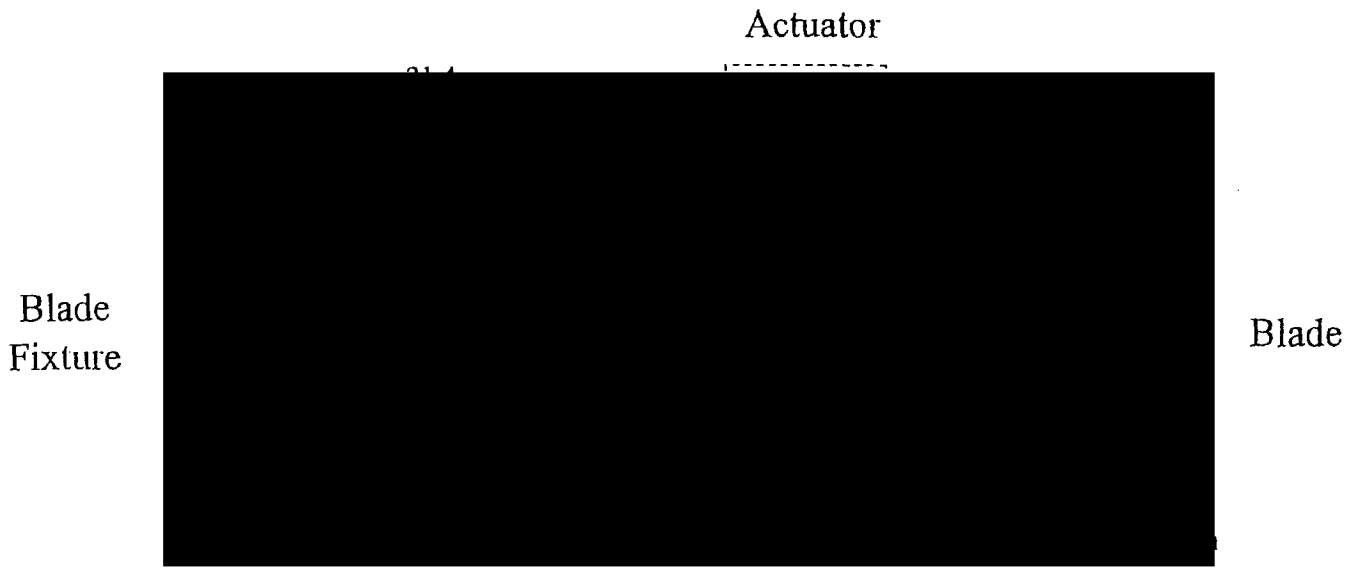
Servo-Hydraulic Resonance Testing:

The advantage that NREL would have in the development of a resonance testing capability is that the capital investments have already been made. We should be able to leapfrog over the development of a Danish type system by taking advantage of our expertise in hydraulics and hydraulic controls. We would also be the only laboratory capable of testing to either method. The Danish method of swinging an eccentric mass will be replaced by existing servo-hydraulic equipment at NREL. Relatively small actuators mounted on a blade can be used to move masses at the blade's natural frequencies. Control may be possible by varying frequency within the MTS Flextest control system, or more likely by varying the actuator stoke at a fixed frequency. Closed loop feedback can be obtained from blade mounted strain gages or from another sensor provided by NREL.

The research assignment is broken into the following elements:

- Develop a conceptual design for a closed-loop servo hydraulic system capable of testing blade from 30 – 50 meters in length using existing NWTC equipment.
- Investigate the best method for controlling blade motion including frequency or displacement control, and various feedback options (e.g. strain, displacement, and load).
- Investigate methods and define a procedure to determine and validate the actual load distribution.
- Develop a one-dimensional dynamic simulation of this system.
- Work with NWTC engineers to develop a detailed design of the hardware required to mount the actuator, the oscillating masses, and the mounting frame.
- Procure the parts necessary to build the resonance testing system.
- Assist in building the system.

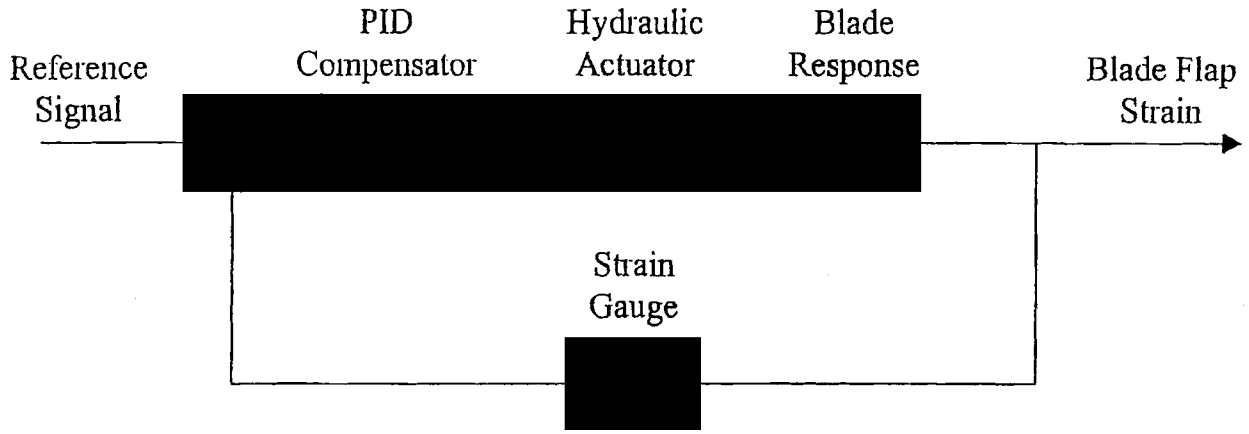
If appropriate, submit a report or package for each of the bullets above. Feel free to discuss any of the work outlined above with your task leader and/or modify the items with his mutual consent.



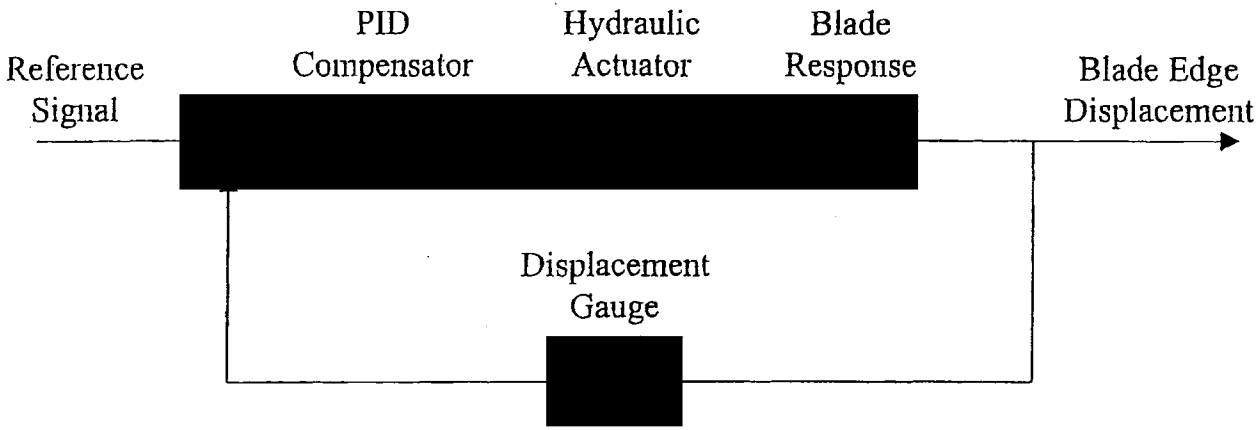
Mi	Mass, kg
M1	493
M2	370
M3	700
M4	185
M5	62

Mass Distribution for Resonance Testing System of EW34a Blade

Flap Actuator



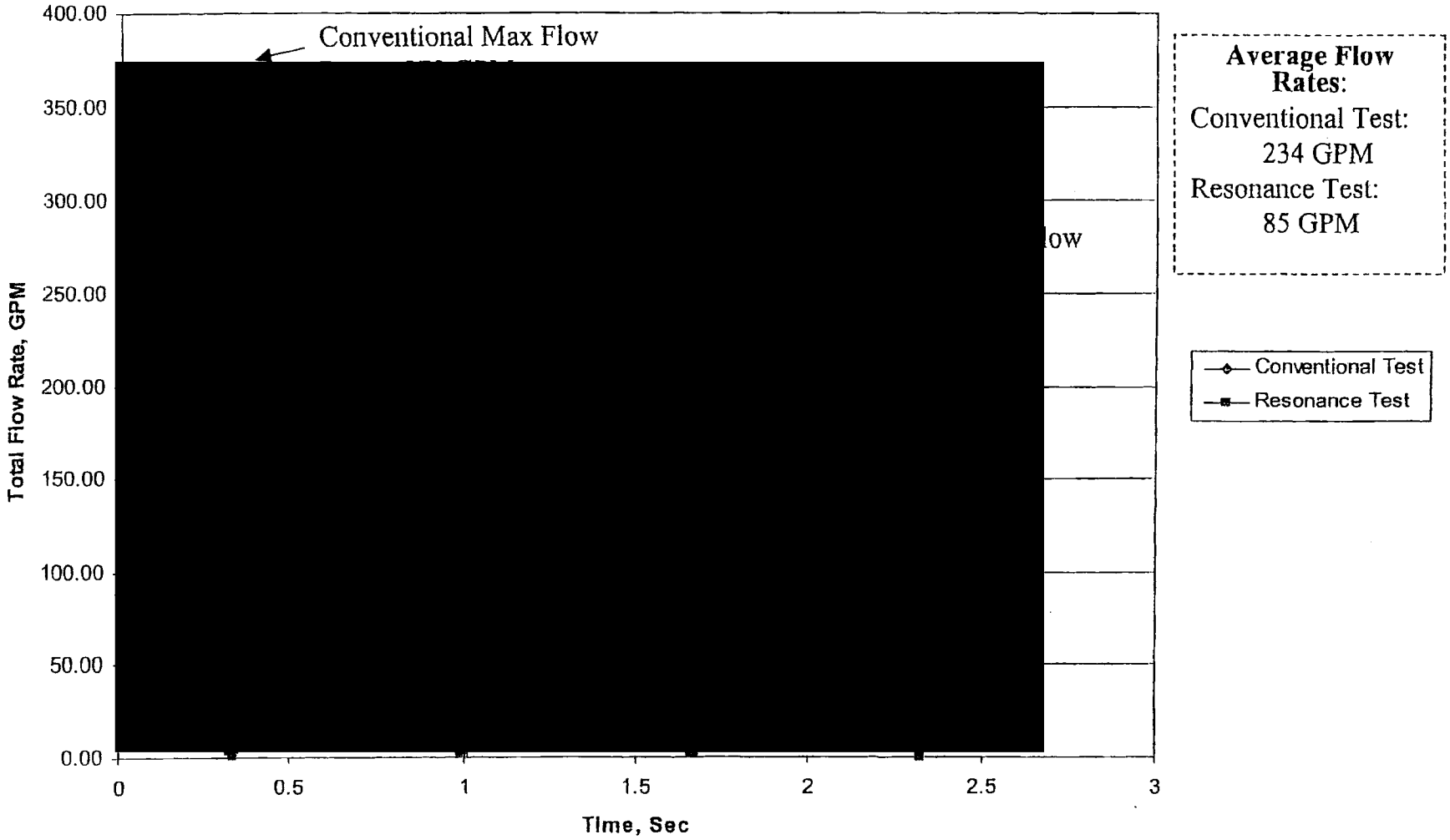
Edge Actuator

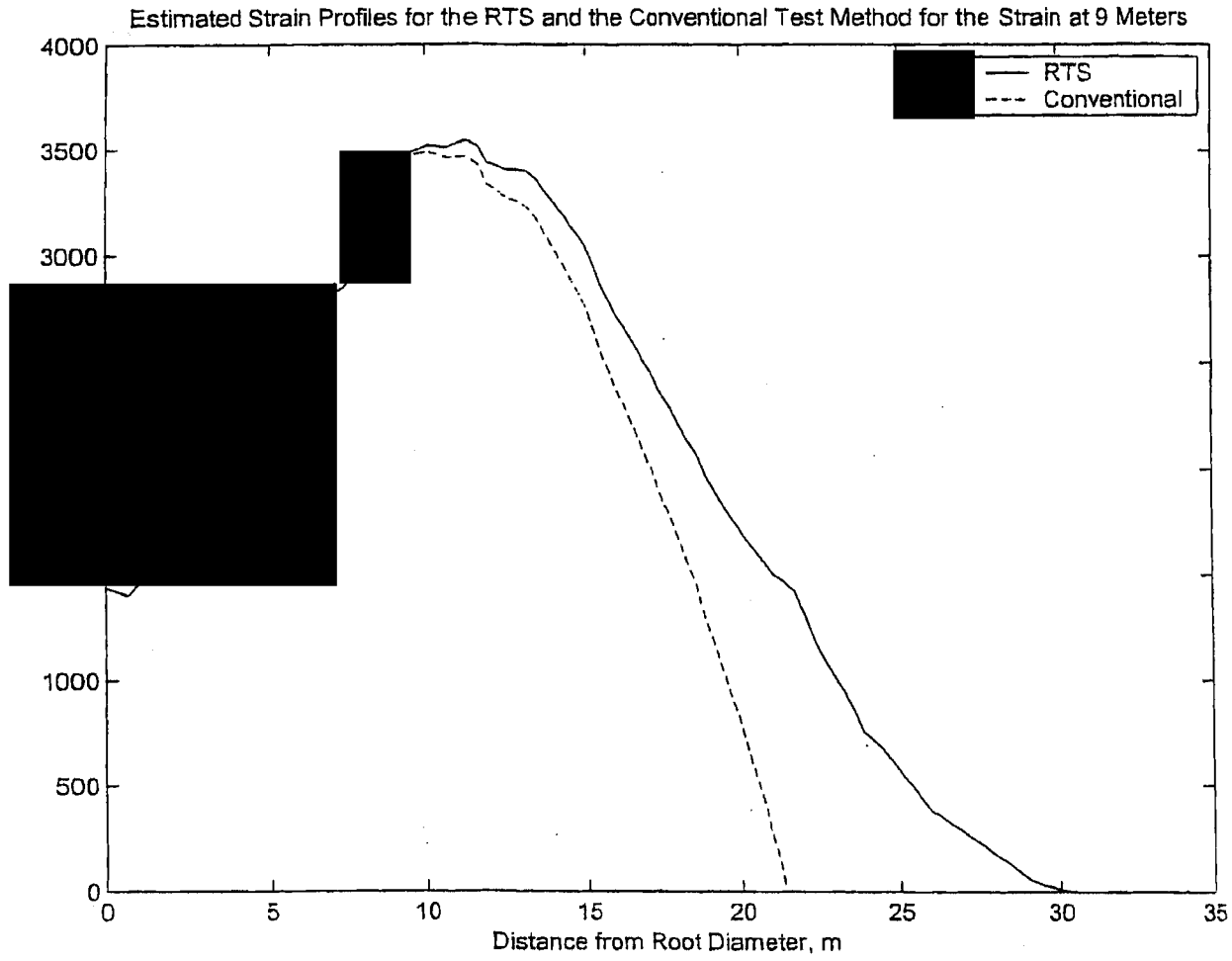


Definition of Controls Blocks

- PID Controller - Software Algorithm used to improve system response
- Hydraulic Actuator - Transfer Function Between the Electric Signal to the Actuator and the Actuator Response
- Blade Response -Transfer Function Between the Force Applied by the Actuator and the Blade Response (Flap and Edge Transfer Function will be Significantly Different).
- Feedback Gauge - Either Displacement or Strain may be used as Feedback for the Control Algorithms

Total Flow Rate Required to Excite the EW34a Blade at 0.75 Hz in Both the Edge and Flap Directions for the Conventional Test Method and the Resonance Test Method




Estimated Strain Profiles for the RTS and the Conventional Test Method for the Strain at 9 Meters
RTS
Conventional
4000
3500
3000
1000
500
0
0
5
10
15
20
25
30
35
Distance from Root Diameter, m

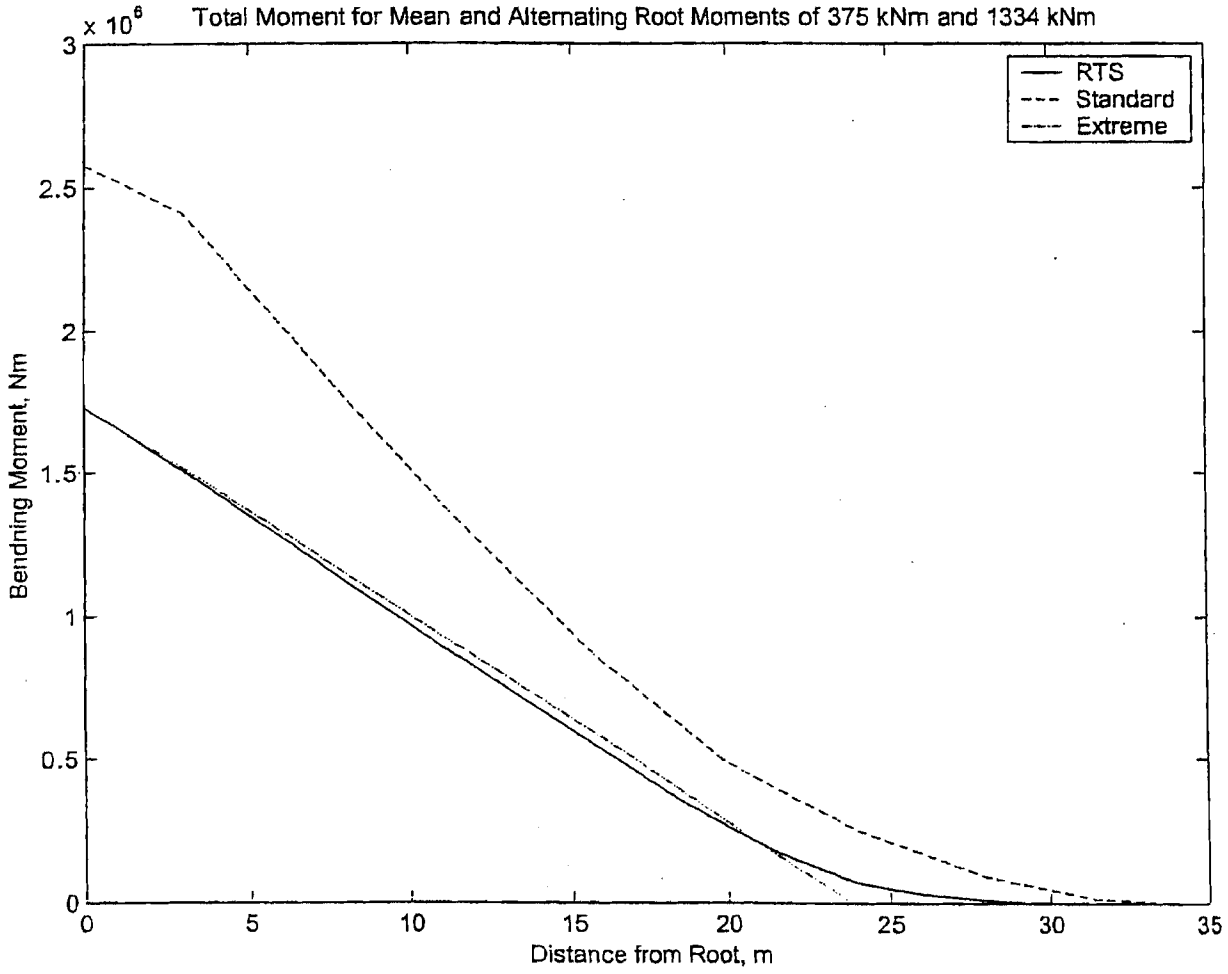

Total Moment for Mean and Alternating Root Moments of 375 kNm and 1334 kNm
x 10^6
3
2.5
2
1.5
1
0.5
0
Bendning Moment, Nm
0
5
10
15
20
25
30
35
Distance from Root, m
RTS
Standard
Extreme

EXHIBIT B

Trenner, Mark

From: Musial, Walter
Sent: Thursday, [redacted] 3:41 PM
To: White, Darris
Subject: RE: research assignment

I agree, but the problem that I see is can you do them simultaneously and still understand what is happening? By the way, for blades, the terminology is flap or flat wise for the direction we are first modeling. Edge or lead-lag for the stiff direction, which we are also interested in testing, and pitch in the twisting direction.

Walt

-----Original Message-----
From: White, Darris
Sent: Wednesday, [redacted] 4:35 PM
To: Musial, Walter
Subject: RE: research assignment

Walt,

I have been working on this project. I still have a lot more to do before I will have a model but I wanted to point out that you don't have to force the system at one frequency. I know that the Danish system can only have one forcing frequency by the nature of the mechanism but I don't see why you wouldn't be able to superimpose multiple frequencies using hydraulics. That way you could excite both the pitch and yaw natural frequencies. Of course, it is probably a good idea to work out the system for just the pitch mode now. I believe the yaw frequency could be added later without much difficulty.

Darris

-----Original Message-----
From: Musial, Walter
Sent: Monday, [redacted] 4:45 PM
To: White, Darris
Cc: Hughes, Scott; Robinson, Mike; Jenks, Mike; Szydlek, Cynthia
Subject: research assignment

Darris

Attached is a copy of the research description I wrote for you. Please do not hesitate to call me or Scott Hughes if you have any questions.

Walt Musial
Team Leader - Development Testing
NREL's National Wind Technology Center
Phone: 303 384-6956
Fax: 303 384-7055

<< File: Darris White assignment.doc >>

Trenner, Mark

From: White, Darris
Sent: Wednesday, June 06, 2001 8:11 AM
To: Musial, Walter
Subject: Found the Problem

Walt,

I found the problem with the mass distribution. It turns out to be user error after all. The original data that you gave me had 22 points. Marshal suggested running this data through a pre-processor routine to expand (linearly interpolate) the data to 100 points. In doing so, the x-axis was rescaled. I needed to compensate for that when adding extra mass to the blade. By not compensating, the modes program thought the added masses where much heavier.

When using the correct scale on the x-axis, I get that the frequency drops from 0.9 Hz to 0.592 Hz.

Darris

-----Original Message-----
From: Musial, Walter
Sent: Tuesday, [redacted] 11:47 AM
To: White, Darris
Subject: RE: Mass Problem

Darris

Scott and I are here and this drop sounds too severe. We would expect less than half of this. What are the masses you are using? Are you trying to match a mean root moment? If so what is it?

We may have to shift Ratios to give equivelent damage at a lower mean as you suggest. There is a danger in doing this because the uncertainty in the equivelent damage formulation greatly incraeses. See our paper/report on the SMT testing.

Walt

-----Original Message-----
From: White, Darris
Sent: Tuesday, [redacted] 7:54 AM
To: Musial, Walter
Subject: Mass Problem

Walt,

I don't know if you are checking your email while you are away but I have a question. I have been trying to determine the correct masses to use for the testing system. The problem is that if I load the blade so that the mean moment is the same as you currently use, the natural frequency of the blade-mass system drops from 0.9 Hz to 0.12 Hz (as determined by Modes program). As you know, the excitation force is quadratically dependent on the frequency. This makes it very difficult to generate the dynamic load required for the alternating moment. A much larger actuator would be required to make this work.

I believe that the mean moment should be decreased significantly. By increasing the alternating moment, the same damage per cycle can be achieved. Do you have any problems with changing the testing conditions in this manner?

Darris

Trenner, Mark

From: White, Darris
Sent: Thursday, June 14, 2001 8:30 AM
To: Musial, Walter
Subject: Remaining Questions

Walt,

Hopefully, you aren't reading your email will you are on vacation. But if you are, I have a couple of questions that will need to be answered before very long.

There are a few questions remaining about the blade system before I can get down to specifying hardware. First, the damping ratio is not well defined. So far, I have been using a damping ratio of 0.1 (as suggested by Marshal). Scott helped me collect some time data on the blade. Using the log-dec method on this data, I determined that the damping ratio for low amplitude oscillations is approximately 0.002. For larger amplitudes, there may be more aero damping but there is a significant difference between the numbers and the damping has a large impact on the size of the excitation mass required. We are planning to collect data from larger oscillations for comparison. This should allow me to determine the approximate damping for the blade at the calculated amplitude. An accurate estimate of the damping is required to specify the actuation forces required. If the damping ratio is more like .002, the mass required would be reduced from 5000 lb to 100 lbs. A reduction of this magnitude would allow the use of a smaller stroke actuator.

The next question is: will the blade be cut? The fundamental frequency of the blade (without added mass) changes from 0.9 Hz to 1.8 Hz as a result of cutting the blade to 70%. This value was calculated on the modes program and confirmed on the cut blade. So, cutting the blade could significantly reduce the test time and allow a smaller excitation mass to be used. Cutting the blade to 70% may cut the test time in half (20 days compared to 40 days). From the calculations that I have done, I can see that the end of the blade is not highly stressed. I assume there are other reasons to test the tip of the blade, such as to determine if manufacturing methods, etc., result in failures. But I don't know if that is worth the delay in testing. Perhaps the test system should be designed to perform the test with the blade uncut since this is the worst case.

Darris

Trenner, Mark

From: White, Darris
Sent: Thursday, June 21, 2001 8:03 AM
To: Musial, Walter
Subject: RE: Phase

Walt,

The blade motion will play a part to the forces required to move the mass but the maximum force required from the blade motion and the maximum force required for the relative motion of the actuator mass will not occur at the same time. I will put together a graph of the two force and the total force required. I think that is the clearest way to go.

Also, I believe that I have found an mistake on one calculation. It is difficult to explain but I will try. Scott gave me the root moment for the blade you are currently testing (Mean and Alternating) and I have been trying to match those moments. The first step is to select the moment distribution that is desired. This allows me to select the mass distribution as a ratio of the total mass. The total added mass is then selected in such a way to obtain the desired mean moment. In order to get the alternating moment, I selected an actuator force (a function of the stroke and actuator mass) so that the sum of the added masses X the moment arm to the masses X the acceleration of the added masses was equal to the desired alternating moment. The problem is that I did not account for the oscillating blade mass. After talking to Scott yesterday, I believe the mean moment is not affected by the blade mass because that was not added into the numbers Scott gave me. However, the alternating mass of the blade should be included when trying to match the alternating moments. The blade mass is already included in the dynamics of the system. So the only change is that the actuator force doesn't need to be as large as I calculated. So the actuator mass can be about 15% smaller for the current configuration.

Darris

-----Original Message-----
From: Musial, Walter
Sent: Wednesday, June 20, 2001 8:15 PM
To: White, Darris
Subject: RE: Phase

Thanks Darris

Thats helpful. I am still bothered by the assumption that the blade motion plays no part in the exitation force. We should get back together and continue our discussion.

Walt

-----Original Message-----
From: White, Darris
Sent: Wednesday, June 20, 2001 2:24 PM
To: Musial, Walter
Subject: Phase

Yesterday you asked about the phase of the actuator with respect to the blade and I wanted to follow up on that question. The phase between the force applied to a system and the response of that system is exactly 90 degrees at resonance. Therefor, when the blade is at its maximum displacment, the actuator will be at zero displacment. At frequencies below resonance, the actuator and blade will be in phase with one another which is the situation that we discussed. At frequencies above resonance, the actuator and blade will be out of phase with one another.

Trenner, Mark

From: White, Darris
Sent: Wednesday, June 27, 2001 11:21 AM
To: Musial, Walter; Hughes, Scott
Subject: Slide

Attachments: PresFlow.ppt

Walt,

Attached is the slide for the resonance test versus the conventional test flow rates. The conventional test assumes a 45" stroke/39 kip actuator. I spoke to Scott about this actuator. He suggested that a stroke of 55" and force of 35 kips may be more accurate. If these numbers are used the max total flow rate for the conventional test becomes 404 GPM.

I also made an error in the previous calculations. I accidentally used the area of the conventional piston in the calculations of the flow rate for the resonance system. Subsequently, the flow rates for the resonance system are lower than we discussed.

Darris

PresFlow.ppt

Trenner, Mark

From: Musial, Walter
Sent: Wednesday, July 25, 2001 4:28 PM
To: 'mark.balas@colorado.edu'
Subject: darris white

Hello Mark

We are having an interesting and enjoyable summer here at NREL. I assigned a project to Darris White to develop a hydraulically driven oscillator designed to excite the fundamental frequency in large wind turbine blades, and generate loads for fatigue testing. Blade moments are calculated from the first flap mode shape, displacements, and frequency, and strain gages will provide feedback to a PID control loop that varies actuator displacement. After spending many hours reviewing Darris's work I think that the project has excellent merit and should be taken to a hardware test phase. (We have also filed a record of invention) The merits are basically that we can do the same tests we have been doing with forced displacements at twice the speed using 1/3 the electrical energy. We can test the entire blade span and it scalable to larger blade sizes. There are many other aspects of this you may be interested in but they are too detailed to get into here. Anyway, Darris has almost gone as far as he can on the drawing board and I was wondering if you would be open to allowing this work to continue (under a preexisting sucontract perhaps) if I could add a little $$ from my blade testing budget. I spoke with Mike Robinson and he was supportive of the idea. Let me know what you think. If you want to talk or get more information give me a call at (303) 384-6956 or email me back. Hope your having a great summer.

Walt Musial
Team Leader - Development Testing
NREL's National Wind Technology Center
Phone: 303 384-6956
Fax: 303 384-7055

Trenner, Mark

From: Musial, Walter
Sent: Wednesday, September 19, 2001 4:43 PM
To: Brantley, Brenda
Cc: Thresher, Robert; Laxson, Alan
Subject: RE: PMC Meeting

Brenda

Here are some brief responses to your questions.

1. To my knowledge, this concept has not been disclosed in anyway.
2. We have no plans to disclose this invention other than what is necessary to develop it further. This will require collaboration with a wind turbine manufacturer and possibly with our hydraulic equipment vendor.
3.No.
4. No.
5.The research to develop this invention was perfromed at NREL by Darris White under the direction of Walt Musial. Darris is a student at the University of Colorado and is currently working under a university contract.
6. No.
7. Prior to determining whether the invention was patentable, some discussion of the invention took place with representatives of MTS corporation. The exact nature of the invention has not been disclosed.

Walt

-----Original Message-----
From: Brantley, Brenda
Sent: Wednesday, September 19, 2001 10:48 AM
To: Musial, Walter
Subject: PMC Meeting
Importance: High

Walter,

have been advised that you are scheduled to give a presentation at the next Patent Management Committee. To assist in properly evaluating the legal merits of your invention, please provide the following information to me at your earliest convenience, but as soon as possible before your presentation:

1) Has the invention been disclosed in an abstract, paper, talk, news story or a thesis? If so, describe.

2) Is a publication or other disclosure planned in the next six months?

3) Has there been any public use or sale of products embodying the invention?

4) Are you aware of related developments by others? If "yes" please give citations. Copies of any relevant patents or publications would be appreciated.

5) If the research that led to the invention was developed in conjunction with a CRADA, WFO or other contractual relationship, please provide the details and attach a copy of the contract or agreement.

6) Is the invention a result of a professional collaboration? If so, please describe.

7) Has the invention been disclosed to industry representatives? If "yes" please provide

details, including the names of companies and their representatives.

I cannot recommend to the PMC that MRI elect title to your invention unless you provide responses to the above questions. Thanks.

Brenda Brantley

Trenner, Mark

From: Brantley, Brenda
Sent: Tuesday, September 25, 2001 10:39 AM
To: Alan Laxson; Myers, Daryl; Ginley, David; Levi, Dean; Tracy, Edwin; Gene Petersen; Joe Perkowski; Ken Touryan; Kiran Kadam; Merwin Brown; White, Paul; Ray Dracker; Bolin, Richard; Rehn, Robert; Judkoff, Ron; Williams, Tom
Cc: Musial, Walter; Li, XiaoNan
Subject: September Minutes

To: Patent Management Committee

From: Brenda Brantley, Patent Administrator

Date: September 25, 2001

Subject: Patent Management Committee (PMC) Minutes of September 20, 2001 Meeting

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Attendees: Paul White, Rich Bolin, Alan Luxson, Bob Rehn, Gene Peterson, Marc Landry, Ed Tracy, Tom Williams, Ken Touryan and Brenda Brantley.

PRESENTATIONS

NREL IR# 01-51 - "Resonance Test System for Wind-Turbine Blades Using Hydraulic Excitation, by Walter Musial and Darris White

This invention discloses a process that is faster and more efficient for resonance speed testing of wind turbine blades.

The invention has been conceptually reduced to practice. The inventors wish to develop a conceptual design system and perform additional experimentation. The PMC recommends MRI elect title and a novelty search be performed to establish novelty. If it is determined that the invention is novel, a PCT patent application is to be filed.

[redacted]

Business Report:

See attachment.

The next PMC meeting will be October 18, 2001 in Conference Room 27/230.

cc: Walt Musial
Xiaonan Li

Trenner, Mark

From: Brantley, Brenda
Sent: Wednesday, October 03, 2001 4:06 PM
To: Musial, Walter
Subject: RE: ROI

At best we could probably file an application by year's end. Unless you have some urgency to file sooner, the usual practice is 3 months. We can make a request for the attorney to prepare the application in less time, but only if it is really necessary. Spending enough time to properly write the application could make a difference in its quality.

-----Original Message-----
From: Musial, Walter
Sent: Wednesday, October 03, 2001 3:30 PM
To: Brantley, Brenda
Subject: RE: ROI

Brenda

It would be useful for us to be able to disclose the information now, but I don't want to jeopardize the patent application in any way. My question would be how long will it take before we can file?

Walt

-----Original Message-----
From: Brantley, Brenda
Sent: Tuesday, October 02, 2001 3:56 PM
To: Musial, Walter
Subject: ROI

Walt,

Paul White asked me to respond to your inquiry about the ROI, NREL 01-51, that you presented before the PMC last week. MRI has elected title to the invention and a novelty search will be performed shortly. The results of the search will be forwarded to you with a request for comments on the differences between your invention and the patents found in the search. If, upon review, it is determined that your invention is, indeed novel, it will be assigned to an outside attorney to prepare a patent application.

You had inquired about disclosing your invention to some outside parties. Paul has instructed me to tell you not to disclose the invention to anyone until we actually file the application. If we can file the application before your scheduled time to talk to these outside parties, then you will be able to disclose.

Please give me a date as to when you were wanting to disclose this invention so that we can determine if we can get an application filed within the time frame. Or, if it is possible to postpone the meeting for a later date.

In the meantime we will proceed with the novelty search.

Trenner, Mark

From: Brantley, Brenda
Sent: Friday, October 26, 2001 2:57 PM
To: Musial, Walter
Subject: FW: Comments on search - resonance system

Attachments: Novelty Search.doc

Thanks for the quick turnaround. We will be assigning your invention to an outside patent attorney to prepare the application for filing. I will let you know the details once that is done.

-----Original Message-----
From: Musial, Walter
Sent: Friday, October 26, 2001 2:33 PM
To: Brantley, Brenda
Cc: White, Darris; White, Paul; Thresher, Robert; Laxson, Alan
Subject: Comments on search - resonance system

The attached file has my comments on the patent search report NREL 01-51.

Walt

Novelty Search.doc